

THE GOLD TRACER.

Practical Guide for Prospectors and Miners.



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PREFACE.

*A*S there have been so many men wanting to learn my system of prospecting for precious metals, even wanting to travel along with me to see the work done, in order to learn, and as it would be impossible for me to teach or even show so many in this way and do justice to each and every one, or even to myself, but still being willing to show them, having no secret in this System of Prospecting which would be a benefit to man, that I would not freely give and as this is one of the greatest, as well as the simplest, cheapest and only scientific way to prospect, I have taken the following plan, which will be in the reach of all, and in the following pages I have presented to the reader such a view of the whole subject of prospecting for the precious metals that any reader will comprehend my meaning.

Heretofore mines were merely found by chance, no skill guided the finder, merely stumbling upon his luck. But how many prospectors are there that never had that good luck, or is good luck always with any man? If it was there would be no need of prospecting after mines, but unfortunately this is not the case, and only by some scientific method can each and every one become successful at prospecting, and it is this scientific method I want to lay down before the reader.

Two of our greatest industries seem to be prospecting and mining. From these industries the precious metals are found and mined, which afterwards are coined into money that circulates through every channel of trade, and without the prospector there would be no mining. We would yet be in the stone age. The prospector is not appreciated at anything like his real worth, every effort should be exercised to enlighten him in his search and by his fellowmen he should be encouraged on his way. Prospecting is as great now as it was in days gone by. Old mines will exhaust in time, so if it was not for the new ones that are being found every year mining would be soon a thing of the past, and on account of the great hidden wealth of the United

States makes this art a very desirable acquirement for everyone engaged in any business connected with the metals.

As there is no work in the English language that would help the prospector in the field makes this work the greatest ever written for prospectors and miners. My object is to offer a book which will fully explain a new system of prospecting, which guides the prospector in his search.

Prospecting, at last, has become a science. This has been proven beyond a doubt by the writer, by actual experience in the field. As the laws of the distribution of the precious metals in the veins are all the same, it would be useless for me to mention them all here, so I will only treat upon one of these metals—Gold, and the reader should remember that while he is studying this one metal, gold, that he is learning the laws of distribution of all metals, for I do not believe that there is any difference between them, and with the help of this little book any man can become an expert prospector in a few days, and it will enable him to find mines and test their values in one day's work in the field.

It is small and simple, but how many little things

have turned out to be great? And for the benefit of the uneducated as well as the educated the writer has endeavored to make it plain. No dictionary needed, no long studies to commit to memory, simply keep this book close at hand and it will guide you as to where, and how to find the precious metals. Never imagine that you can study this book awhile and then prospect without it, for you will find that you will be lost in the field, and that the things thought to be of the least consequence, will be of the greatest importance.

Some men may think that there is too many prospectors already in the field, and no place left for them. This is a mistake, for the United States alone promises the richest and most famous regions in the world, and from every direction comes the assurance that there is, commonly speaking, no end to the possibilities. But prospecting has hardly begun, the surface ground is scarcely broken. Thousands on thousands of square miles are yet to be explored, thousands of mines are yet to be found, whole regions are rich beyond all computation, and there is not in all the world to day a field of more gloriously golden opportunities for

the intelligent and enterprising prospector and miner.

No need to go to the Klondyke or the Yukon, or even to Alaska. Fortunes without danger or hardship are here for thousands yet to come, and this book is written to guide the prospector and miner, and will be a safe guide to follow in any part of the world. A cheap, simple, quick, handy and accurate method to follow in prospecting, it is this system of prospecting I want to lay before the reader. A system that I have studied out and by actual experience in the gold fields, I have proved this system of prospecting to be the only safe guide to follow.

Simple, because the hills and mountain sides are tested for the ore bodies by simply panning a few panfulls of the loose earth-matter. Quick, because it only takes a short time to dig these small post holes and pan the samples, which are taken from each post hole dug. Cheap because he is under no expense to speak of, a pick, pan and shovel, a few sample sacks and a small bill of provisions, being sufficient to enable him to test miles of the gold belts for hidden veins. This is not the only reason why it is cheap. It saves the time, work

and money that it takes to dig holes or shafts and run cuts and tunnels which takes years of hard work and hundreds of dollars and after all this time and money spent, the prospector is still left in ignorance. He cannot see one inch further than he has tested with his holes, shafts, cuts or tunnels. He may tramp over the hills and mountains for years, and yet he cannot see the hidden veins. Luck or chance can be his only show in this way of prospecting, and as good luck heretofore has only favored a few, this goes to show that we need some scientific system to follow. This method is accurate, because when anything has been scientifically tested we know what it contains, and when we test the loose earth-matter for auriferous veins then we will know whether they lay hidden there or not, and if the test proves that there is a body of ore there. The prospector can readily locate the exact spot, no matter at what depth it may be buried from sight, by the loose earth-matter. After the traces of gold has been found it only takes a few pans more of this loose earth-matter to bring the prospector to its source.

CHAPTER I.

How to Become a Successful Prospector or Miner.

A SUCCESSFUL man at any trade is the man that has the knowledge of the object in view, and in prospecting after metals, if the prospector will acquaint himself with the laws of the distribution of the precious metals in the veins, and with the System of Prospecting for Veins, which the writer has endeavored to make plain to the readers, there will be nothing between him and success.

And, after the mine has been found, the miner can readily tell whether it is a pocket, shoot or body of ore, and if large or small. He will be able to extract the rich rock from the poor with success. There are many that think that an ore body, that is, shoots, chimneys and bonanzas of ore are veins or lodes of quartz extending through the country, metalliferous throughout its entire length, but this

is a mistake which they will have to learn before they will ever make successful prospectors or miners. Whenever a man prospects a vein or lode in one spot, either by chipping pieces off from the croppings or by sinking a shaft or by cutting it with a tunnel, he will never know what the vein contains and will get discouraged and leave, thinking that there is nothing there, when he may be leaving a fortune behind him, which has been so often done before. And the miner that imagines that his vein is equally as rich throughout its entire length will extract the poor ore as well as the rich, mixing it all together, and when his ore is sampled or milled he will think his mine too poor to work. There has been thousands of feet of tunnel run, thousands of feet of shaft sunk, time and money spent and nothing gained. Whenever a rich piece of float is picked up which is so often done, the finder will imagine there is a vein of ore, equally as rich throughout its entire length, and will expect to find this rich rock at any spot along this vein. So he prospects for this vein, and not the rich spots on the vein. When he finds a vein and it is not rich he thinks that this is not the right one, for it isn't as rich, so he keeps on running cuts

or tunnels, sinking holes or shafts until he gives it up that he cannot find the right one. Now if he had known that this rich piece of float was from some small shoot on the vein he would save time and money, for if a man knows what he is looking for his work is easier accomplished. As a rule the richer the rock, the smaller the bodies, although we have rich ore bodies with thousands of tons still we have veins with only a handfull of ore.

Oft times miners uncover a vein with a tunnel, or shaft, or a small hole in the ground, and test the vein in this spot. If it is poor, or low grade, the most of prospectors will throw it up, thinking that the whole vein is the same, while others may think that depth is all that is needed to strike rich ores. This way of prospecting and mining is what causes lots of work and poor pay, and the reason companies fail, camps go down, and the mines are condemned.

One of the most important things in prospecting or mining is to thoroughly understand the meaning of a pocket, chimney, bonanza, shoots of ore, or a body of ore, they all meaning a certain portion of the vein which is the metaliferous portion of the vein, the balance of the vein being bar-

ren or unproductive, (see cuts, Figures 3, 20, 7 and 8). Auriferous quartz ledges have paying quantities of metal only in spots or streaks; the quartz may be traced for miles, but only here and and there will it pay to work. No Metalliferous lode is worked, I believe, with much profit, for any great length. The great quartz lode of Mariposa, called sometimes the mother lode of California, has been traced, it is supposed, for thirty miles or more. At least crop-pings of quartz nearly in a straight line are seen at various points between Bear Valley, in Mariposa County, and Angels, in Calaveras County, and it is assumed that these croppings belong to the same lode. In some places this vein is very rich, but the rich spots are not long, and are far apart, and between these spots the rock is nearly or en-tirely barren.

I do not suppose there is a metalliferous vein in the world that is equally rich for any considerable distance, either up and down, or lengthwise. The ore-shoots of this coast exist in bunches and streaks, which cut the axis of the vein at every conceivable angle, and these are always less than

the length of the vein itself, and sometimes less than its width also.

It must not be presumed that these great veins are gold-bearing throughout their whole course, or that even a notable proportion of the quartz that can be found is metaliferous. It is only here and there, at wide intervals, that mines can be found which can be worked with a profit, in fact, the extensions of these veins is generally very limited, and the metaliferous portion is always considerably less in length than that of the quartz itself. Like the great Comstock lode of Nevada, and other metal bearing veins, it is found that the most of the gang or vein stones is still more abundant in certain portions thereof, called bonanzas, or chimneys, while they usually have a pitch lengthwise of the lode, according to their position, oftentimes running out of one claim into that of another, leaving the one comparatively poor, and enriching the other.

These mines I speak of are not prospects, but noted mines, and mines that have produced largely. These are facts that none can deny. Then what is the use of prospecting at any one spot on a ledge, and then leave it for someone else to find

good ore just a little to one side from the place that you had prospected, and what is the use of driving a tunnel until you know what portion of the ledge you are going to reach, or know whether there is a shoot of ore in a mile of you, or know whether the shoot is six inches long or longer?

There is no wonder that so many make a failure in mining when they will take such great chances. If a miner wants to make a success at mining the first thing to do is to find his ore-bodies on the surface by prospecting the vein on top, which can be easily done in a short time, and at a very small expense. Second, prospect this ore-body with a shaft until he is confident that it extends down, and see if there is sufficient ore, either in width, or lengthwise of the vein, or in richness to pay for further developement or not. Third, never run a shallow tunnel, for they are useless, and only time and money lost in running them. Fourth, always be careful in extracting the ore, never mix it up with a lot of valueless rock, for this will reduce the value of the ore and only put you to a greater expense, besides the percentage that is always lost in treating the ore will be greater. Fifth, never im-

agine if one piece of ore assays one hundred dollars to the ton that all of the vein will assay the same throughout its whole length or up and down, or even in width, until you have taken samples, and at short intervals and had them assayed, across its width, as well as its length, and up and down. This will show the rich spots, as well as the poor ones in the vein.

The surface ground should be prospected around every mine, old ones as well as the new ones. It matters not whether they have been rich or poor, the chances are that the largest and richest bodies of ore have not been found, or there may be several shoots of ore on the same vein, or in other hidden veins equally as rich or richer. The miners may be working or have been working upon some small seam or feeder, or some vein comparatively low-grade compared to the other veins that may be found close by. I have found this to be the case in nearly every camp that I have visited; and it will be found to be the case by any one that will follow my instructions. And let me say here and now, that if any part of my method or instructions is left out by any one, they should depart from the whole system, leave it for some one else to follow who

will lay aside all prejudice. Often our prejudices are unreasonable. Some are accustomed to believe imagination, or to receive opinions from others without examining the ground by which they can be supported.

I have not written this book to please anyone's belief, or to condemn anyone's belief, nor to make it appear as though I knew it all, or that I discovered this method all by myself, for it is the mining experience of the age that has caused me to fall in the rut which I follow in prospecting or mining. And I suffer not any study to prejudice my mind so far as to despise all other learning, and the man that does is lost, never to be found again. Follow my instructions to a letter, or this book will be worthless to you, and all I ask of any one that is fortunate enough to own one of these books is to give it a fair trial, laying aside all other methods and signs, or imaginations, and follow my plan, and I know that he will profit by the experiment. That mines are not found in certain parts of a country does not condemn this method of prospecting. It only shows that there is no mines in that part of the country, and the prospector will have to go to some other mineral belt to operate in, in order to

find valuable mines. And those that condemn this system of prospecting now, will be sorry in the end, for they will see that others have profited by their mistakes.

CHAPTER II.

Ore Bodies.

ORE bodies, ore shoots, bonanzas and chimneys, are one and the same thing, the only difference being in the size and richness of the ore body. When the ore body or shoot is mineral-burnt, it is most generally called a chimney, for it has a smoky appearance, and when the metalliferous portion of the vein is short it is most generally called a shoot.

All ore bodies have other veins, which intersect the main vein and form the ore body. These veins or seams are called feeders, most generally these feeders are quartz veins, and can be readily seen, but sometimes they are clay or iron seams, and very hard to discern, and are oftentimes overlooked. These feeders are often found to be metaliferous in spots or streaks, in cases where there is a parallel vein, and feeders have a direction so as to intersect this second vein, they will form another body of

ore, at the intersection (see cut Fig. 1), sometimes these feeders are small, and only extend a short distance back into the wall (see cut Fig. 4), from this main vein; in this case they hardly ever contain any gold.

Where there is several seams found in the same strata, dike or gang, they will be found together at some point either in depth, or lengthwise of the vein, (see cuts Fig. 5 and 2), which usually forms a large body of ore, especially if the seams are metaliferous themselves. These feeders intersect the main vein at all angles, and the straighter the angle of intersection these feeders have to the main vein the shorter the shoot of ore will be found. (See cuts, Figures 7 and 8). Still in some rare cases it may differ in some respect from this rule, but most always the richest ore is found at the intersection.

Whenever the vein is in sight, either along the surface or has been followed with a tunnel, the prospector or miner can readily tell every ore body and the richest spots in the ore body by the feeders. When the feeders form an ore body, which is often the case, there will always be a trace of gold found in one or more of these feeders, which will lead the miner down to the ore body if he will only

follow it down, but I do not think there is any one that can tell what depth the miner will have to go to reach this ore body, some being found in a few feet from the surface, while others have been found at a great depth. Still an idea can be formed by the width between the feeders and their dip toward each other.

Pockets only differ in a few respects from other auriferous bodies, and the greatest one of these is in the richness of the ore body, no matter how small or large; they are always very rich, and have been found nearly solid meteal, but like all other ore bodies, many small ones are found to one large one. The gold is hardly ever found in the quartz, or vein stone, when the pocket is reached.

There is always a trace of gold in the loose earth below a pocket, and from one pocket to another, as the vein is followed downward, (see cut, Figure 20), but most always the trace from one pocket to another will be found between the vein stone and its wall, and most always the first gold seen on the quartz will be plastered on the side next to the wall, and this is a very good sign that the pocket is not far ahead.

Pockets most always occur in the bends or de-

fault in the vein, (see cuts, Figures 7, 8 and 10), and at places where the vein has been cut off by either other veins or seams, and different formations, or sometimes the cleavage in the same formation (see cuts Figure 7—E E Cleavage), and like the ore bodies they always have feeders which intersect the main vein at the pocket, or there being a number of veins or seams coming together, which forms the body. Pockets like all ore bodies, usually have a pitch lengthwise of the lode, according to their position, (see cut Figure 20). These bodies of ore are found in all formations, that is all kinds of rocks contain valuable mines and pockets, except the volcanic rocks.

This shows the fallacy of the notion that some particular rock is in all cases more favorable to find mines in than others.

It is a well known fact that the enclosing rock has usually great influence on the quantity and quality of the ores, and that a rich body passing into a different formation frequently becomes poor or barren, but after passing through this formation into that of another it most always becomes productive again. (See cut, Figure 9). The aurifer-

ous portion being as liable to occure in one as the other.

CHAPTER III.

Placer Gold.

IT is a mystery to some where placer gold came from, but all placer gold has originally been confined in rocky veins, and these veins, crumbling off, decomposing, sliding, rolling, washing, and grinding, freeing the gold by this process, that it has gone through for centuries to become gathered into canyons, and streams, there to be concentrated into deposits, and by rights it is quartz gold, erastered out in reaching the bars, where it is found; this will be plainly seen by any one that will travel around and look for himself.

Course gold is hardly ever seen but what there is more or less quartz through it, and there isn't hardly a day but what some placer miner finds a piece of quartz with gold still scattered through it, not being groken up to free the gold. If this was not the case we would have no placer mines, nor would the valleys, stream beds and low places be filled with

sand and gravel, which shows that it took immense quantities of rock to fill these low places with this ground-up mass, in places thousands of feet deep. The water in these streams, from the smallest to the largest, is driving this mass, more or less, every year towards the ocean or low spots.

Base ores and other fine gold veins never make rich placer ground, the gold being so fine that it is hardly ever seen after leaving the veins, only on large streams and beaches along the ocean, depositing in the short bends of the rivers, ofttimes with only quicksand for its bed. But veins carrying coarse gold, which is most generally called pocket veins, are what feed the gold in the placer mines.

The gold found in the bars, in streams far from the mountains, having been carried a long distance, is in flat scales or small smooth particles, as though it had been ground fine and polished by long attrition; but in small gullies and streams in the mountains, the gold is usually coarse and rough, as if it had suffered little change after being freed from the quartz by which it was once surrounded. In hundreds of instances the gold in gullies is being traced unmistakably to an auriferous quartz lode in the hillside above it. The plac-

er miners in following streaks of loose gold have been brought to the rocky source from which it came, (see cuts Figures 12 and 22). This the prospector should understand, which would give him an idea where to search for the vein. The men that have this idea in view are busy at work in their search for pockets and ore bodies, and hardly a day passes but what veins are being uncovered by the prospector.

The idea of washed gravel or no gold is another thing that has been proved a wrong idea, for gold is found where there is only slide rock, being in gullies where living streams never run to wear the rocks smooth. Placer gold is found anywhere as long as the veins are above it that carries the gold to feed the bars, but is most always found in gullies or streams, these places being natural ground sluices, gathering the gold in their beds, and the gold gives out in these gullies or streams whenever they extend above the veins that carries the gold. Whenever the gold cannot be found any farther up the stream or gulley it is quite evident that the veins are close by, unless there has been an ancient stream, and the other has cut through it, redepositing the gold from the old bed to the new. This

can always be told by the smoothness of the gold, and washed pebbles that will always be found in the older bed of gravel.

Snake River is worked here and there for nearly her whole length, being about 600 or 700 miles long, still there hasn't been any coarse gold found, until she cut through the mineral belt at what is known as Conner Creek. Here coarse gold is being mined out. Places have been found very rich. There has been hundreds of thousands of dollars taken out along in the bars of this river, at this place, which is only 15 or 16 miles in length from the lower end to the upper end of this coarse gold, and this place is about 400 miles from the head of the stream.

This fine gold that is being found all along this river nearly the distance of 300 miles above the coarse gold, has come from base or fine gold veins some place, or different places, along its course, probably brought in by different streams at different places, as these rich spots only occur here and there, at wide intervals. As one travels down the river the first place worked with any profit is at Blackfoot, Idaho. The next place at Bonanza Bar, at the mouth of Rock Creek. The next at Sal-

mon Falls, the next at Catherine Creek, then the Cove, and at Warm Springs, and then the mouth of Boise River, and gold is found here and there all the way down to the mouth of the river.

Another thing that will go to show that placer gold comes from quartz veins is taking the fineness of the gold in these many places, and see the difference in the fineness of the gold at different points.

Below this coarse gold district the gold varies from \$16.00 to \$17.30 per ounce. In following up the stream the first place that coarse gold is found goes from \$18.00 to \$18.40 per ounce. At the upper part of this coarse gold it will go from \$18.80 up to \$20.00 per ounce. After leaving the coarse gold, (going up stream) this fine gold differs in its value also. Below the mouth of Boise River \$16.00 and \$17.00 per ounce. A short distance above from \$18.40 to \$19.30 and \$19.50 per ounce. At Salmon Falls, going from \$19.25 to over \$20.00 per ounce, and along up by Blackfoot it comes down to \$17.00 and \$18.40 per ounce.

Then again you will find that where there are several different streams heading in the same mountains that the fineness of the gold will differ in each stream, where the stream gathers the gold

from the different positions of the vein, or fed from different veins, as it is found around Canyon City, Oregon, at Pine Creek gold is worth \$16.00 per ounce, Marysville gold \$17.30 per ounce, Canyon Creek \$18.00 and better per ounce. Burnt River has three places along her banks that gold is found in paying quantities, and these places are at wide intervals, and between these places there is no gold to be found that would pay. This shows that where there are no gold bearing veins there is no placer gold. This is found to be the case in nearly every mining camp in the United States.

Mr. Charles A. Bramble, D. L. S., late of the editorial staff of the Engineering and Mining Journal, and formerly a Crown Lands and mineral surveyor for the Dominion of Canada, in speaking of the placer gold, says: "Where this gold comes from is an open question. Geologists, mineralogists and chemists, mining engineers and practical prospectors, have all disputed over the source of this gold already found, and he says could it be known with certainty how and under what conditions this gold got where it is found, that the problem of seeking for it might be made easier, but unfortunately this is not the case, and that all prospecting for the

home of the precious metal is groping in the dark." In regard to the prospectors groping in the dark I will venture to say it is at an end, and that the happy light of knowledge will hereafter guide him in his search for the home of the precious metal, and when they see the trail of placer gold traced back to the rocky sources from which it came, will settle this question between them for all time to come. And in this little volume the problem of seeking for it, I trust, is made quite plain to the reader. Mineralogists say that discoveries of many deposits have been successfully mined were the results of chance, no skill guiding the finder; that he merely stumbled upon his luck. This is true heretofore. Mines were more accidentally found than by any scientific guidance, but—

Darkest nights must have a dawning, though the skies be overcast;
Longest lanes will have a turning, and the tide has turned at last.

FIG 23



CHAPTER IV.

How to Pan.

AS I have given a brief sketch as to where gold may be found, I will now turn to the more important part of the study, as how to find it, and here I want to call the reader's attention to the mining pan, which will soon become one of the greatest as well as the most needed tool in his use in this system of prospecting and for the benefit of those that have never used the mining pan I will give them some idea how it is used, which will be a great help to a new beginner.

The miner fills his pan with whatever he may want to test for gold, goes to the bank of a stream, squats down, as shown in cut, (Figure 23), puts the pan under water, then with his hands he mashes up the lumps and washes off the largest stones and picks them out. When all of the dirt is dissolved so the gold can be carried to the bottom of the pan by its weight, then he shakes the pan in order to

settle the gold, giving it a half round motion, and with a slight jerk towards him, enough to stir the dirt well without slopping over the rim of the pan. Then by tilting up the pan in the water the top may be washed out by a slow motion. When in this position never let the dirt move or slide in the pan, for this will push out the gold, which will be sure to be in the edge of the dirt. Always shake the pan to settle the gold with a slight jerk towards you; this not only settles the gold, but will keep it behind in a bunch.

When the dirt is washed sufficiently there will be about one teaspoonful of sand left in the pan. Take about the same quantity of water in with the sand, then tilt up the pan so as to leave the water and sand in one edge of the pan, shaking it sideways, letting the water flow backward and forward over the sand. The gold will gather behind the sand, and can be easily seen. Placer gold can most always be seen by running the water around in the pan, washing the sand from the gold. But fine gold, such as will be found in quartz veins, or in a trace on a hillside, will never be seen by running the water around in the pan, but with the above

way the finest gold can be seen, which is often overlooked, even by experts.

To tell a man how to become a good panner is a hard thing to do; but with an idea a man can soon be able to use the pan, and one should always remember the old adage of "practice makes perfect."

The best way to do, to be sure that you can save gold in a pan is to pan in another pan or tub, saving the washings, and pan it over again. The more gold you have in the pan at one time the harder it will be to save. Never imagine you can save all of the gold until you have tried the waste, and see if it has been saved or lost. Lots of old hands will find that they can't save all of the gold, or havn't been saving it all in panning.

Always keep the gold covered with the sand or water. If this is neglected while paning, leaving the gold bare at times to the atmosphere, the gold becomes dry or nearly so in a few seconds, and as the water flows back in the pan it will pick up this gold on its surface, which will be readily carried away and lost, and to avoid this the gold should always be kept under the sand and as near in a bunch as possible.

CHAPTER V.

Tracing.

ALL auriferous veins can be found by tracing the loose gold which will always be found below the auriferous portion of the vein, scattered along down through the loose earth-matter, for some distance below the vein on the hillside, which has rolled and washed down, after being freed from the quartz or other earth matter, and by taking a pan-full of this loose earth matter in the mining pan and panning it down, or, in other words, concentrating it down with the mining pan, the gold can be readily seen, and with this system, (see cuts, Figures 13, 14, 15, 16, 17 and 21) of panning the loose earth matter the gold is traced back to the veins, and to the richest spots in the veins, and where veins have only one spot of ore, then he will be led to this one particular spot.

The prospector, equipped with pick, pan and shovel, with sacks to carry samples in, goes to the

place that he wants to prospect. Here he commences to sink small holes, the same as would be sunk to set a post in. These holes should be sunk to bedrock if convenient, if the loose earth is anyways deep, this is not always necessary, but advisable at any depth. Out of each of these holes take out a panfull of the loose matter, taking an average lot from top down to bedrock, and put it in the sack, tying it up so as to keep them all separate from each other, sinking these holes at short intervals along the line, and at a short distance below the place wanted to be prospected, as will be seen in Figures 6, 12 and 22, and by taking out as many samples as can be carried handy at one time, taking them to water, panning them out, watching closely in each panful panned, for gold, the shade, size and quantity. Going back, getting more samples and panning them out until the ground is prospected or the trace of gold has been found.

After the surface has been gone over in this way, and there is no gold to be found on the hillside, then there will be no use for further investigation; this portion of the place being prospected. But when gold has been found, in one or more of these samples, and the prospector wishing to find its

source, he should go back to this hole that this sample containing gold was from, or if there was more than one, go to the one that contained the largest quantity of gold, taking this hole for a starting point (see black dots 1 in cuts Figs. 13, 14, 15, 16, 17, 21 and 22).

Now sink two of these holes, one on each side of this one, (see black dots 2 and 3 in cuts Figs. 13, 14, 15, 16, 17 and 21), square above on the hillside. This will leave the three holes in the form of a triangle, with the sharp point pointing down hill, (as will be seen in above mentioned cuts). Taking a sample out of these two holes last dug, and panning them to see what each one contains, pains should be taken so as to not make any mistake in what hole each sample was from. The best way to do this is to number the sacks that the samples are carried in. A mistake made in one sample will cause the work to be done over again, and in this, as in most everything else, a stitch in time saves nine.

Denote the quantity of gold in each of these two pans closely. Going back to the holes that the greatest quantity of gold was from, digging two more holes above the same as before, and so on,

until the vein has been reached. He should be exact in digging these holes, to take samples from, as shown in last mentioned cuts, and it will be seen that if a line was stretched from the vein or the auriferous portion of this vein, back to the first hole, that it will cover one line of these holes.

After gold has been found, before attempting to trace it up to the vein, the prospector should go back to the same hole that the gold was first found in, taking a sample out of the topmost soil, and another one underneath, and so on down until bedrock has been reached, and test each one separately. This will readily show at what depth the next holes will have to be dug in order to reach the gold. This will not only show at what depth to dig the next holes, but will give him a chance to select his samples from the richest portions of the earth matter, which will be a great help in tracing the gold, the more gold there is to be found in a trace, the easier it will be to follow.

Any gold found in the loose earth-matter on the hillsides is a trace, although some may be richer than others. Some are found to be very fine, and only a few particles to the pan, while others are found to be several dollars to the pan. Coarse

gold is often found in the loose earth-matter, as well as fine gold. Coarse gold found in a trace indicates that it has come from a pocket, while fine gold comes from all kinds of auriferous rocks, and are often followed up to a pocket of coarse gold.

Traces of gold will be found at all depths of the surface ground, being found in the topmost soil at times, and then again there will be no gold found only on bedrock. Most always the nearer the prospector comes towards the vein the deeper down the trace will be found in the ground. These loose streaks of gold usually have different positions on the hillsides, very seldom found to be straight up and down with the hill. It is a good plan to dig these holes closer together as you go up the hill. By doing this the prospector cannot possibly miss the auriferous spot in the vein. Three postholes can be used instead of two, as shown in Figure 16. Gold found in most any placer mine can be readily traced back to the rocky source from which it came, in a very short time. But before prospecting for the trace, the prospector should gain all the information he could in regard to the placer gold. First, as to where the richest spots occurred along the stream. (see cut, Figure 22).

Second, at what point the stream bed ceased to pay, (see cut, Figure 12). Third, what difference, if any, in the value of the gold at different points along the stream, or, if there is more than one gold-bearing stream, find out as near as possible the value of the gold in each stream. The difference in the fineness of the placer gold and the knowledge of each spot that the gold was taken from, will show the prospector at what place or places to look for the vein or veins. The next step to take will be to pan out some of the placer gold at these different places along the stream's bed, and at the head of the placer ground, observing the gold closely with a good magnifying glass. There is a great deal of important information to be gained by the different shades and smoothness of the gold. First, if there is more than one source of the gold, it will be readily seen in the different shades between the different particles of gold. Second, the distance the gold has traveled after being freed from the quartz veins can be told by the brightness or darkness of the gold. The brighter or whiter, or, in other words, the newer it looks, the closer the source; or the deader, darker, or copper colored it looks, the greater distance it has traveled.

The roughness of the particles of gold also indicate the distance it has traveled, but not so accurately, as the size of the stream and the amount of washed gravel will have to be taken into consideration. Gold being polished smooth in a short distance in a large stream, oftentimes it becomes worn smooth without moving after being lodged in the stream bed, while gold may travel a long distance in a smaller stream or gully and not show any signs of wear, it being more of a slide than a wash.

When the veins are close by the real fine gold will be found deposited amongst the coarser gold, and will be very bright. It will take practice before the prospector can come to any correct knowledge as to the distance that the gold has traveled, but with the idea as to how it is done he will soon overcome this. No prospector should leave out this important study, for after it is once learned he can test the placer along the stream, and by the difference in the gold tell the number of veins carrying the gold found in the placer, and what distance he will have to go to find each vein. Then by panning the loose earth matter close around and at short intervals, he soon finds the trace of gold, which will be easily traced up to the vein.

Three postholes can be used instead of two, and will be a great help in some cases. If the vein is a long ways off, or a long ways to one side, not being straight up the hill, by digging three holes at a time, and sampling all three separately, if the vein should be at any great distance to one side he will reach it much sooner and at a point lower down the hillside, (see cut, Figure 16).

When prospecting for a trace the prospector should use his own judgment as to the place that would be the most favorable to find mines or pockets. No man can tell where gold lays until after it has been found, as Job once said that gold was where you found it, and the only places that I could mention as being favorable places is where fragments of quartz float can be found, especially if they contain gold. Where veins can be seen at the surface any place along the hillsides at the head of placer ground, in places where the placer has been richer in spots along the stream, prospect the hillsides at these spots. The gold is often washed down from a vein or veins which increases the gold at these spots, as will be seen in cut Figure 22. Always follow this same system of prospecting. Whenever you want to prospect a spot always take

a sample of the loose earth matter and pan it down to see what there is. If there is gold, then there is something there carrying gold, either at that place or above. But if there is no gold, then there will be nothing found there. In most all cases gold can only be found a short distance below a vein, so don't expect to find gold everytime at any great distance below the vein. When prospecting a vein always start in 10 or 15 feet down the hillside below the vein, sampling the loose earth matter along this line, (see cuts, Figures 22 and 6), until its entire length has been tested, the same in testing dikes or contacts. It will take time and work to find traces, but after once found, the work in getting the vein will be short.

Auriferous float rock is often picked up, and to find the vein the prospector should test the loose earth matter with the pan, taking a sample from the spot where the fragment of float was picked up and one on each side of this one, and three more further up the hillside, until the trace has been found, it being found often some distance above the spot that the float was found. The fragments of rock rolling down much further than the gold the trace of gold in the vein should be followed down-

ward by the same system, as following the trace in the surface ground, (see cut, Figure 20), in either case he is led to the richest portion of the vein.

While tracing, if the prospector should at any time find that there was no difference in the amount of gold found in the two last holes tested, (see black dots 2 and 3, and 6 and 7, in cuts, Figs. 13 and 15), it would make no difference which one of these two holes he would take for the lower point of the triangle in digging the next two holes, and at any time in tracing up these loose streaks of gold and not able to tell the difference between the gold which will always be found at the vein, and that which is found below, he should watch the amount closely, and when the full amount was not found, in the last two samples tested, he should drop back, (see black dots, 10 and 11, 12 and 13, and 14 and 15, in cut, Figure 13). The full amount of gold not being found in 10 and 11, 12 and 13 are tested; still not found, 14 and 15 are tested. The full amount will be found in one or both of these last two tested, and in either case he can see the spot the gold is coming from. After the vein has been uncovered he should commence at one end of the vein, where it has been uncovered, taking

samples one after another, until it has all been tested, and he knows the exact spot the gold is from. This should never be neglected. So often do we hear of someone finding it rich where someone else had prospected, and had left it thinking there was nothing there. So prospect it well while you are prospecting, and you will reap by it in the end.

If there is no vein to be seen, after it has been uncovered, then the whole bedrock should be tested at this spot. After the gold will be found to be coming from other rock as well as quartz veins. Often the walls are found to be the richest ore of the two. Often there are other veins which can be found close by, equally as rich or richer, so the entire surface ground should be tested before it is abandoned.

CHAPTER VI.

To Uncover Hidden Veins.

ONE of the most important parts of this system of prospecting will be in the study of the different shades of gold. The prospector, in following up those loose streaks of gold which will always be found scattered below the veins amongst the loose earth-matter on the hillsides, will be led up to the veins or to the auriferous portions of the veins, but when the vein is so situated on the hillside, or when there are two auriferous veins, one being above the other, on the same hillside, or in cases where pockets are being traced up and there being several pockets, at different places one above the others, (as will be seen in cut, Figure 21), which is often found to be the case, and in cases of this kind the prospector will be led astray by simply following the gold. He would not know when to dig to find the vein. He would be led from one to the other, not knowing that he was passing over

what he was in search of, and in places he would be led up one side of the hill and down the other, and for these reasons the study of the different shades of gold becomes the most important, most necessary, and most particular part of this system of prospecting.

SHADES OF GOLD.

The gold has different shades of color at different intervals from the veins. Gold, after being freed from the quartz, gradually changes its color, and the first gold freed from the quartz is the gold found the greatest distance from the vein, and, as it has been exposed to the atmosphere the greater length of time, it becomes darker, or, in other words, it has an older appearance than the gold found closer to the vein. Gold found to be dark, or copper colored, will gradually change lighter, brighter, or newer in appearance as the distance grows shorter towards the vein, until it becomes so bright that particles will glisten when their positions are being changed around in the mining pan, and will be one evidence that the vein has been reached. At this point the prospector will discover very fine, whitish gold, apparently heavier than the

rest, which will always remain behind the rest of the particles of gold, which is also evidence that the vein has been reached, as this gold will never be found or seen at any other place. There is yet another gold which will be found to be brighter, at a distance from the vein, and as the distance becomes shorter, it will be found to have a coating of vein matter over it, and will often have to be rubbed or scoured before the prospector can tell what it is. But this very fine white gold will always be found when the vein has been reached, and should never be passed by.

About the only way that a new beginner can see the different shades of gold will be to save the gold from each sample panned as he ascends the hillside, keeping each trace by itself. The difference can be readily seen. A good way for this is to take a pie plate and make small furrows in the bottom of the plate, putting each trace, found in each sample, by itself in these furrows. Their difference can then be readily seen and studied.

Before being able to judge by the shades he should watch closely the quantity of gold in each sampled panned, and when the full amount could not be found above he should drop back (see cut, Fig.

13), until the full amount is found again, then the loose earth-matter should be moved from this spot marked thus X in the cuts, and the bedrock carefully investigated by panning.

Although there is no necessity of going above, or passing the ore shoot while tracing, as any one ought to be able to distinguish the difference between the appearance of the gold that has been found at some distance from the vein and the gold found closer by, or at the vein, there is as notable a difference between the gold as would be in tracking or trailing anything else. If we were trailing a man, horse or deer, and he had passed along a day or so before we would see that his tracks were not fresh, but as we come nearer to him we would see that the tracks were fresh or newly made. So it is with the gold; no matter how fresh and new it may look, if its source is some distance away it will become fresher and newer as the distance gets shorter towards its home and becomes so bright that it will glisten when its home is reached. Note this change carefully with the aid of a good magnifying-glass, and you will find that in a very short time you will be able to

tell at what distance you will have to go before you reach the vein.

Pockets, shoots, chimneys, bonanzas or ore bodies of any kind have streaks of loose gold which are always found scattered for some distance below its source, being carried downward by ages of rain-storms and freshets, or, in other words, when the vein-stone becomes decomposed or washed up into a fine powder, freeing the gold, which was carried down hill with the other loose material, which is constantly moving downward towards the lower levels, and by this explanation the reader will see at a glance that this will leave a trace of gold to follow, which will lead him up to the auriferous portion of the vein. It sometimes happens that fragments of the quartz are found scattered over the surface ground, and whenever the prospector finds these fragments of quartz he should always take a sample of the loose material and test it for gold with the pan, as the placer miners do in prospecting for placer gold. They test the alluvious by panning in this way all placer mines are found. Every stream-bed is tested for the precious metal, unless accidentally found, as was the case when Marshall discovered gold in California, on the 19th

day of January, 1848, while digging a race for a saw-mill. The swift current of the mill race washed away a considerable body of earth-matter, leaving the coarse particles of gold behind.

But in nearly every case, placers have been discovered by miners who were searching for them, and who spent much time and labor in the search. But most of the rich auriferous lodes have been found by men who were not looking for quartz. Hunters, travelers, placer miners, road makers and others occasionally come (without thinking of it) upon valuable veins.

CHAPTER VII.

Post Holes.

POST HOLES are small holes sunk in the loose earth-matter, a very small hole, the same as farmers most generally dig in setting a post. The width of the shovel blade will be sufficient in most cases, as the surface ground is shallow in most places, and only the loose earth-matter is tested, but it should be dug down to bedrock if convenient. Still it is not always necessary, but advisable while prospecting to find a trace, but after the trace has been found they should be dug down according to the depth of the trace.

If the trace is found to be in the topmost ground then the samples are to be selected from the top ground; but when the trace is found to be on bedrock then the samples should be taken accordingly. Hillside, gullies, or, in fact, any place the prospector may wish to prospect, should be tested in the same way, (see cuts, Figures 22, 6 and 12). By

this system of prospecting the auriferous veins are readily found, and the exact length of the ore body can be told without even seeing the vein, (see A to A, in Figure 22).

SAMPLES.

A sample is to be a panfull of the loose earth-matter that is taken out of the post-holes, an average lot to be taken, while prospecting for the trace. But after the trace has been found it should be selected from the richest portion of the ground. A panfull of vein stone, gravel, or, in fact, a panfull of any substance wanting to be tested, makes a sample; these samples should be carried to water and concentrated down with the mining pan until gold can be readily seen.

SAMPLE SACKS.

Sample sacks are used to carry the samples in, and should be large enough to hold two pansfull of loose earth-matter, one sample in each end of the sack, with a string tied at the center, and one at the end to keep samples separate from each other. Sacks the size of a flour sack, or just a common

flour sack will do, and makes a handy and convenient pack thrown over the shoulder or across the saddle.

CHAPTER. VIII.

Mislead.

HERE are so many different ways that a prospector can be misled that I cannot pass them by here, and it would be wrong for me to overlook this important fact. But as I only intend this for a handy pocket book, I do not care to dwell upon any subject longer than will be necessary for to enlighten the reader, and put him upon his guard, and in regard to this subject, I will advise the reader first, always be sure that the sample-sacks are free from gold. Dust them out after carrying rich samples in them. Turn them inside out and shake them well. Second, always use a smooth bottom pan, and be sure to rinse it out every time before testing a new sample. Third, when panning in a tub, pond or any still standing water, where gold has been panned out and scattered around before, be careful or you will be salted every time you pan a sample; for this gold, when

once it becomes dry, will readily float, or swim on top of the water. The gold around the water's edge becomes dry, and when the water raises it readily picks up this gold, carrying it around on its surface, which will be readily settled by agitating the water, settling in the miner's pan. Fourth, never take any other man's word as to the place or places to prospect. He may not tell you the truth, misleading you for self-gain, having some object in view. There are some men that want all of the benefits of this earth, with heaven thrown in.

Gold is sometimes carried up to the surface by gophers, or by the uprooting of trees, here to become scattered around on top of the surface ground. This is often the case in places where the debris is any-ways deep and sandy, and the prospector should be on the watch as the best of judgment must be used in cases of this kind, in order to find the vein. This gold is often carried up from the vein, while it may have been carried up from the loose gold that has come from the vein. Such places are most always marked by the quantity of gold in the trace. The trace will lessen or will be apparently lost, with the exception of a color or

two, that is, a color or two of gold can be found scattered around this spot, and the prospector cannot find any lead, traces or trail to follow, or, in other words, these few colors of gold apparently have no course to follow. In cases of this kind the prospector must drop back and take his samples from the debris next to the bedrock. Often small bunches of the loose earth-matter slips or slides down the hill. This breaks the trace in two or one end of the trace is carried away by the slide. In this case it often takes considerable work in order to find the other end of the trace, as the distance it has come cannot always be told, nor can its direction be told in all cases. Of course if the direction can be readily followed back, this will save time and labor in finding the other end of the trace. In very deep ground, and where the trace is at a great depth, the best and quickest way will be to run an open cut or a tunnel, following the streak of gold, by this same system as would be used on top, or in shallow ground.

Always take these samples as nearly as possible in the direction that the loose earth-matter has rolled, or washed down from. In testing for the

direction, as black dots 2 and 3, in cuts Figures 13, 14, 15, and 17, which is a test for the direction.

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CHAPTER IX.

Gold.

GOULD, like all other metals, will be found as chlorides, sulphides and crystalized, and when found in these different states of purity will be easily pulverized into a fine powder, which act as sediment when put into water; the water becomes cloudy or muddy, and it is very easily carriedⁿ away by the water, but when yet in coarse particles^e can be easily saved in the pan and traced back to^{ll} its source the same as the other gold, by taking ^{le} test on the black sand which will be saved in the pan while panning, which can be accomplished by^{ll} the use of a few acids and a few small tools. The combination of gold with various oxides and sulphides of other metals, will be often met with in paying quantities, and the gold, while in with these other metals can seldom if ever be detected with^e the naked eye, and the prospector should be equipped^s to make these tests while in the field, (see gold^e

test, page 72. This should not be lost sight of, especially while prospecting around base ledges. Heretofore gold has been found almost exclusively in the metallic state, the reason for this, I think, being on account of its being so readily detected by the naked eye.

Sulphide of gold, in small particles in black and rich brown color have been found by the writer on Snake River, Idaho, and on Dixie Creek, Oregon; also a chloride of gold along with other chlorides, in rich brown, yellow, greenish purple and creamy white color, and crystals of gold in different parts of our gold belts, in white crystals, rich yellow and bright amber color. Pure gold is seldom if ever met with, most always being alloyed with some other metal, such as silver, tellurium, iron, platinum, mercury, lead, copper, bismuth, and even tin and others. Gold is being found in all rocks except the volcanic rock, and found also in the sea-water, about 13 grains to one ton of sea-water.

Quartz has been called the mother of gold. Certainly quartz and gold are found connected to-day, and will go to show where to look for that precious metal, gold. "Quartz is an essential constituent

of granite, and abounds in rocks of all ages."—Dana.

"Quartz, pure silex, generally, impure silicic acid, an acid composed of one part silicon and one of oxygen."—Thomson.

"Or one of silicon and three of oxygen."—Berzelius.

An elementary substance in the atmospheric air. Rock crystals, flint, and other varieties of quartz, are nearly pure silicic acid.

Iron is another associate of gold, and has been called the mother of all metals, and gold is seldom if ever found without the presence of iron, and often found imbedded in the iron, and even alloyed with it. It abounds in every part of the earth. It has many different varieties and colors, black, brown, greyish yellow, greenish red, etc.

Crystallization and iron are two of the greatest signs of gold, but in so many ways the knowledge of this fact becomes useless to the prospector. First, every rock is a crystalized rock, all of the different kinds of quartz, as well as the many different kinds of spars, help form nearly if not every rock known and, if iron abounds in every part of the earth, what light would this throw upon the

subject, or how could it help the prospector in his search for gold? Besides the debris covers nearly all rocks from the prospector's sight, nor is this the only evidence that we must have some other system to follow, besides studying the different rocks. But, as I do not care to weary the reader with these facts, I will say, in passing them by, that if the gold could only be found in one or two, or even in twenty or thirty of these different rocks, then the case would be different. But this is not the case so the only way to prospect with any success will be to test the hills and mountain sides with this cheap, simple, quick and only accurate system of prospecting, and then nothing can be between him and success.

There are so many veins which have rich ore only in spots, or streaks, the balance of the vein stone is poor, or entirely barren, and as their difference cannot be detected with the naked eye, when once mixed together, it never can be successfully sorted again, one portion will be apparently as rich as the other, and for this reason the vein stone should always be tested while yet standing in place, enabling the miner to take out each portion by itself, and never should be neglected in

any mine or by any miner, for this will save time and money.

Ofttimes mines are worked several feet in width and if properly tested they would find that they were working several tons of worthless rock to one one ton of pay ore. The expense of treating this worthless rock, and the percentage lost from each ton milled, which must come out of the valuable ore, will cause the richest ore to be too poor to work. Take a vein one foot wide, of one hundred dollar ore, and if carefully treated about ninety per cent. is saved, and would pay a good profit to the miner, but take a foot vein of the same ore and nine feet more of worthless rock, and what would be saved? If ten per cent. were lost in treating each ton, he would save nothing. Many a valuable mine has been condemned by not properly testing the vein stone. The first step should be to test the vein stone lengthwise, its width, and up and down also, even its walls should be tested, which is often found to be rich also.

It is a notable fact that all the contents of vein-stone were deposited in the ledge while in solution, and the crust of the earth was prepared for its reception by bursting or cracking open, and this so-

lution readily filled up these seams or furrows in the earth, the metals themselves being carried in with the other solution, here to be deposited into spots or streaks in the veins during the crystallization of the vein-stone.

Some claim that crystallization was caused by heat, but this I cannot believe. My reasons are many, of which a few I will try and explain to the reader. Most certainly it was crystallized by the composition of different minerals, and other elementary substances, as rock forms around soda or sulphur springs. The solution from these springs form into crystallized rock at the present day, without the assistance of heat, nor does any of the rocks, outside of lava rock, show any signs of being once in a molten mass, not even showing any signs of ever being heated, only at the surface, in places near some volcanic or lava bed. There is no rock in the mineral belts but what will change its appearance when heated, except the lava rock. By quartz alone it can be proved that fire had little to do with the forming of the rocks.

The quartz we find in fissures or veins is also found in the oldest rocks, the oldest rocks being composed of one part quartz, and, according to

science, this rock formed the first crust of the earth. If so, where did this heat originate from in order to form this first rock? As the old darkey once said in his sermon, that the first man the Lord made he leaned him against the fence to dry, when one of the colored brethren yelled out, "Who made the fence?" and I ask, Where did this fire originate from in order to form the igneous rock before the earth's crust was formed?

I have prospected and traveled through the mineral belts from California through the different states to the Canadian line, spending nearly my life time in the mountains as a hunter and trapper and prospector, and, in my travels I have never seen what is called a blow-out except in the volcanoes. (or what they call igneous rocks), only the lava beds. I have a collection of free gold specimens from nearly all kinds of rocks, and I could have had others if I could have kept them; but as they were easy to crumble I could not keep them in traveling around. I do not believe that there is a rock amongst the many species but what in some place it can be found to be mineral-bearing, except the lavas, and I don't think that there is one of these rocks metaliferous everywhere found. The great-

est portion of any rock will be found to be barren or unproductive, and the simple reason that lava rock contains no gold is because it has been melted, and experience has taught us that if we melt rock the metal is lost unless we use some substance to prevent its escaping with the fumes.

CHAPTER X.

A Test of Ores—Gold Test.

PULVERIZE the ore very fine and mix with three or four times its weight of Caustic Potash or Caustic of Soda, then heat to a low red heat until all the contents cease agitation and becomes tranquil. When cool add three or four times its bulk of Hydrochloric or Muriatic Acid after standing three or four hours in a warm place add about one part of Nitric Acid to three parts of the Muriatic, which has already been added (all of this should be in a Porcelain dish or a Beaker glass) let this stand in a warm place one hour, then add a little more Nitric Acid. Stir with a glass rod or piece of glass. After standing one hour longer add a little more Nitric Acid and warm and filter. Rinse the ore with warm water and pour into the filter paper. After it has all filtered through precipitate the gold from the filter with a soluton of copperas (Sulphate of Iron) dissolved in rain water.

After this has been added let it stand in a warm place one hour, then drop in a few more drops, and if further precipitation takes place add half an ounce of the Sulphate of Iron and let remain an hour longer in a warm place. Then filter again, rinsing the dish to get all upon the filter paper. After all the liquid has passed through dry and melt or dry and weigh without melting.

No single acid will dissolve gold, but Aqua-regia, which is made of three parts of Hydrochloric Acid and one part of Nitric Acid dissolves it. Gold is readily dissolved by any solution producing chlorine. Some of the mixtures are Bisulphate of Soda, Nitrate of Soda and common salt. Hydrochloric Acid and Potassium Chlorate and bleaching powder. The action is more rapid in hot than in cold solutions. If to this solution you add some Sulphate of Iron you will get a precipitate which is metallic gold, but does not look like it, it being in a brown powder, and if melted you get a bead of pure gold.

Another test for gold is to take the solution as above obtained and add thereto a solution of chloride of tin when you obtain a purple

precipitate. This chloride may be purchased at any chemists, but may be prepared as follows: Take pure tin foil or file a piece of tin into powder and heat very hot, (nearly to boiling) with strong Hydrochloric Acid in a porcelain dish or beaker glass, always keeping tin in the glass or dish by adding tin if necessary. When no Hydrogen gas is evolved no bubbles arise dilute with four times its bulk of pure water, slightly aciduated with Hydrochloric Acid and filter. Keep the filtrate in a well stoppered bottle in which some tin has been placed.

Test for Silver.

Pulverize the ore very fine and weigh out what you would want to test. Put it in a test tube and add equal parts of Nitric Acid (C. P. strong) and water, then gradually warm the test tube over a lamp or candle flame, boiling gently until the red fumes pass off, (hold the test tube a little slanting over the flames and keep from inhaling the fumes) allow the ore to settle and filter through a filter paper, then add salt water. If a white precipitate forms at the bottom silver is present, or a better

way is to add some water and take a piece of copper wire, coil up one end and stand it up in the liquid and leave it stand half an hour. In either case, by pouring off the liquid and drying the precipitates you can melt into a bead of pure silver and weigh the bead, or weigh before melting.

If there should be copper in the same ore the copper will be dissolved with the silver, and will be deposited upon a strip of polished iron or a knife blade, or any iron and can be gathered and melted the same as the others or weighed without melting.

Gold.

After the silver and copper has been taken out, the same ore that remains can be tested for gold by adding three parts salt, one part water and one part Nitric Acid. Boil gently from thirty minutes to one hour. Filter and add a few drops of Chloride of Tin, a purple precipitate indicates gold, or Sulphate of Iron (solution) may be used, which will give a brown precipitate.

Copper.

Put pulp in a Porcelain cup, add forty drops of

Nitric Acid twenty drops of Sulphuric Acid and twenty drops of Hydrochloric Acid. Boil until white fumes arise, cool and add a little water, filter and add a nail or two to the liquid, the copper will be precipitated and may be gathered up and weighed.

Platinum.

Platinum is the most refractory metal to test as it must be boiled for at least two hours in the mixture of Muriatic and Nitric Acid, known as Aqua-regia, a small amount of Alcohol is to be added to the solution, and the latter filtered. The platinum is precipitated with Ammonia Chlorids.

Nickel.

Nickle may be determined as follows: A little of the powdered ore taken on the point of a pen knife and dissolved in a mixture of ten drops of Nitric, and five drops of Muriatic Acid, boil a few minutes and add ten or twelve drops of water. A small quantity of Ferro-Cyanide of Potash will give a whitish green precipitate indicating nickle.

Copper is a very easy metal to test. First crush the ore then dissolve in Nitric Acid by heating,

then dilute with water and filter then add a nail or two.

Sulphrid ores are usually difficult to treat and should be roasted before testing for metals.

The Blow Pipe.

Every prospector should have a blow pipe and its outfit. When in the hands of a skillful operator the amount of metal in ore, as well as its nature, may be told. The outfit costs merely nothing, compared to its value in the testing of ores, and how to use it is easy to learn. In many different ways besides testing ores this apparatus becomes useful, so much so that when once the prospector finds out its usefulness he would be lost without one.

Gold in Pyrites.

Iron Pyrites, or Copper Pyrites has a color somewhat similar to that of gold. These, with others, vary in the yellow shades, but by the practiced eye are instantly detected, and of course by washing or rubbing them their difference would be plainly seen, as native gold is soft and malleable, while these others are brittle and can be easily pulverized into a powder. Yet these Pyrites should

always be tested whenever found, for more or less gold is most always found associated with them and this can only be told by some accurate test. To make these tests the ore should be ground up into a very fine pulp then roasted and either salt, Caustic of Soda or Caustic of Potash should be used while roasting and kept at a low red heat for one hour or longer, but not too hot, then the amount weighed out, and the solution added and after all particles have subsided filter and add the precipitates. Then filter or evaporate to dryness and melt.

Chlorination.

One process is the Chlorine Gas is formed from black Oxide of Manganese, Sulphuric Acid and common salt. This gas is introduced at the bottom and allowed to permeate the ore. Let stand two or three days, then draw off into a tank, use water to wash all of the Chlorine from the ore then add to this solution zinc shavings, or a solution of Sulphate of Iron, let it settle, and draw off the solution, gather the precipitates, dry and melt..

A Simple Handy Outfit.

A simple and handy outfit for the prospector to have with him is, first, the different acids required to make these tests, then a small quantity of the different precipitates, a test tube, blow pipe, two porcelain cups, and a filtering apparatus, which can be made from a clear beer bottle. This will be seen in Figure 18, a few small pieces of charcoal and a few filter papers, will be sufficient to make these tests.

Greasy.

To amalgamate rusty or greasy gold, use a solution of equal parts of Syanide of Potassium, Sal-ammonia, Sodium or (common soda) and Oxide of Manganese. Add sufficient water to make a weak solution, some of this solution should be kept on the quicksilver at all times.

Values of Metals.

Gallium, a metal....per pound Troy,	\$39,000.00
Barium	975.00
Calcium	1,800.00
Cerium	1,920.00
Ebrium	1,680.00

Glucinum	.....	3.750.00
Zirconium	.....	5.400.00
Lithium	.....	5.250.00
Vanadium	.....	7.500.00
Yerbium	.....	3.060.00
Rubidium	.....	6.802.00
Stronitum	.....	3.150.00
Yttrium	.....	3.060.00
Ruthenium	.....	1.800.00
Niodium	.....	1.725.00
Didymium	.....	2.400.00
Rodium	.....	1.725.00
Palladium	.....	1.050.00
Titanium	.....	515.25
Osmium	.....	900.00
Chromium	.....	375.00
Iridium	.....	817.50
Molybdenum	.....	168.75
Uranium	.....	675.00
Thalium	.....	168.75
Manganese	.....	97.50
Platinum	.....	136.50
Pottassium	.....	48.00
Trongsten	.....	86.25
Alluminum	.....	.45

Antimony .....	.07 $\frac{1}{2}$
Bismuth-crude	146.25
Silver	7.50
Tin	13 $\frac{3}{4}$
Zinc .....	.03
Arsenic .....	.07 $\frac{1}{2}$
Nickel .....	.33 $\frac{3}{4}$

Values of Gold per Ounce at Different Degrees of Fineness.

Fine	Dol'rs	Cents.	Fine	Dol'rs	Cents.	Fine	Dol'rs	Cents
$\frac{1}{2}$		01.03	50	1	03.36	774	16	00.00
1		02.07	100	2	06.25	822 $\frac{1}{2}$	17	00.26
5		10.34	500	10	33.79	871	18	00.52
10		20.67	1000	20	67.18	919 $\frac{1}{2}$	19	00.78
20		41.34				967 $\frac{1}{2}$	20	00.00

Gold Values.

480 Grains in one ounce		5c. per pwt. is	\$ 1 00 per oz
3c. per grain is	\$14 40 per oz	70c " " "	14 00 " "
3 $\frac{1}{3}$ c " " "	16 00 " "	75c " " "	15 00 " "
3 $\frac{1}{2}$ c " " "	16 80 " "	80c " " "	16 00 " "
4c " " "	19 20 " "	85c " " "	17 00 " "
4 $\frac{1}{4}$ c " " "	20 40 " "	90c " " "	18 00 " "
		95c " " "	19 00 " "
		100c " " "	20 00 " "

1 ounce pure gold is worth..... \$20.67 $\frac{1}{8}$
 1 pound " " " " 248.06 $\frac{1}{6}$
 $\frac{1}{0}$ 0

Composition of Mineral.

	per cent.
Iron Pyrites.....	{ Iron 47 Sulphur 53
Arsenical Pyrites.....	{ Iron 34 Arsenic 46 Sulphur 20
Magnetic Pyrites.....	{ Iron 60 Sulphur 40
Galena.....	{ Lead 87 Sulphur 13
Zinc Blend.....	{ Zinc 67 Sulphur 33
Cinnabar.....	{ Mercury 86 Sulphur 14
Silver Glance.....	{ Silver 87 Sulphur 13

Schermerits	{	Sulphur	16
		Lead	12
		Silver	25
		Bismuth	47
Smithsonide	{	Zinc Oxids	65
		Carbonic Acid	35
Sylvanite	{	Gold	28
		Tellurium	56
		Silver	16
Calaverite	{	Gold	44.5
		Tellurium	55.5
		Some Silver	
Ruby Silver	{	Silver	60
		Antimony	22
		Sulphur	18
Copper Glance	{	Copper	80
		Sulphur	20
Horn Silver	{	Chlorids	25
		Silver	75
Carbonate	{	Carbonic Acid	17
		Lead Oxids	83
Calamine	{	Silica	25
		Zinc Oxide	67
		Water	8
Stephanyte	{	Antimony	16
		Sulphur	16
		Silver	68
Diamond	Carbon	100	
Onyx	Silica	100	
Sapphire	Alumina	100	
Turquoise	{	Phosphoric Acid	33
		Alumina	47
		Water	20
Meerschaum	{	Silica	61
		Magnesia	27
		Water	12
Garnet	{	Alumina	21
		Silica	36
		Iron	43
Emerald	{	Glucina	14
		Alumina	19
		Silica	67

Mexican Onyx.....	{ Lime.....	56
	{ Carbonic Acid.....	44
Topaz.....	{ Oxygen	35
	{ Aluminum.....	30
	{ Fluorin	20
	{ Silocon	15
Amber	{ Carbon	78
	{ Oxygen	10.5
	{ Hydrogen	10.5
Ruby	{ Magnesia	12
	{ Alumina	85
	{ Chromic Acid.....	3

Gold Alloys.

Gold alloys readily with most metals, the following are some of the most common.

Maleable.	Color of Alloys.	Brittle.	Color of Alloys.
Palladium	Gray to White	Rhodium	Yellow
Osmium	Pale Yellow	Bismuth	Brass Yellow
Iridium	Pale Yellow	Antimony	Pale Yellow
Mangarese	Gray	Cobalt	Dull Yellow
Copper	Yellow	Zinc	White
Silver	Pale Yellow	Mercury	White
Tin	Pale Yellow	Nickel	Brass Yellow
Iron	Gray	Lead	White
Platinum	White		

CHAPTER XI.

A History of Quartz Mining.

A sketch of the history of quartz mining in regard to the success of some, and the failure of others, and the reason that some were successful, while others failed, will be a subject worthy of note, as some men fall into the same old rut that was followed, and found to be a failure by others years ago. And to enlighten the miner, or in other words, to keep him out of this rut of failure, I have selected the first quartz mining in California.

The first quartz miners in California were Mexicans, who knew how gold-bearing rock was reduced in their native country as matter of profit. He only selected the rich pieces to work, throwing aside those portions that would not yield a profit. With experience in the observation of quartz and a mode of working in which failure was almost impossible, these Mexicans did very well.

Their success excited the envy of the Americans.

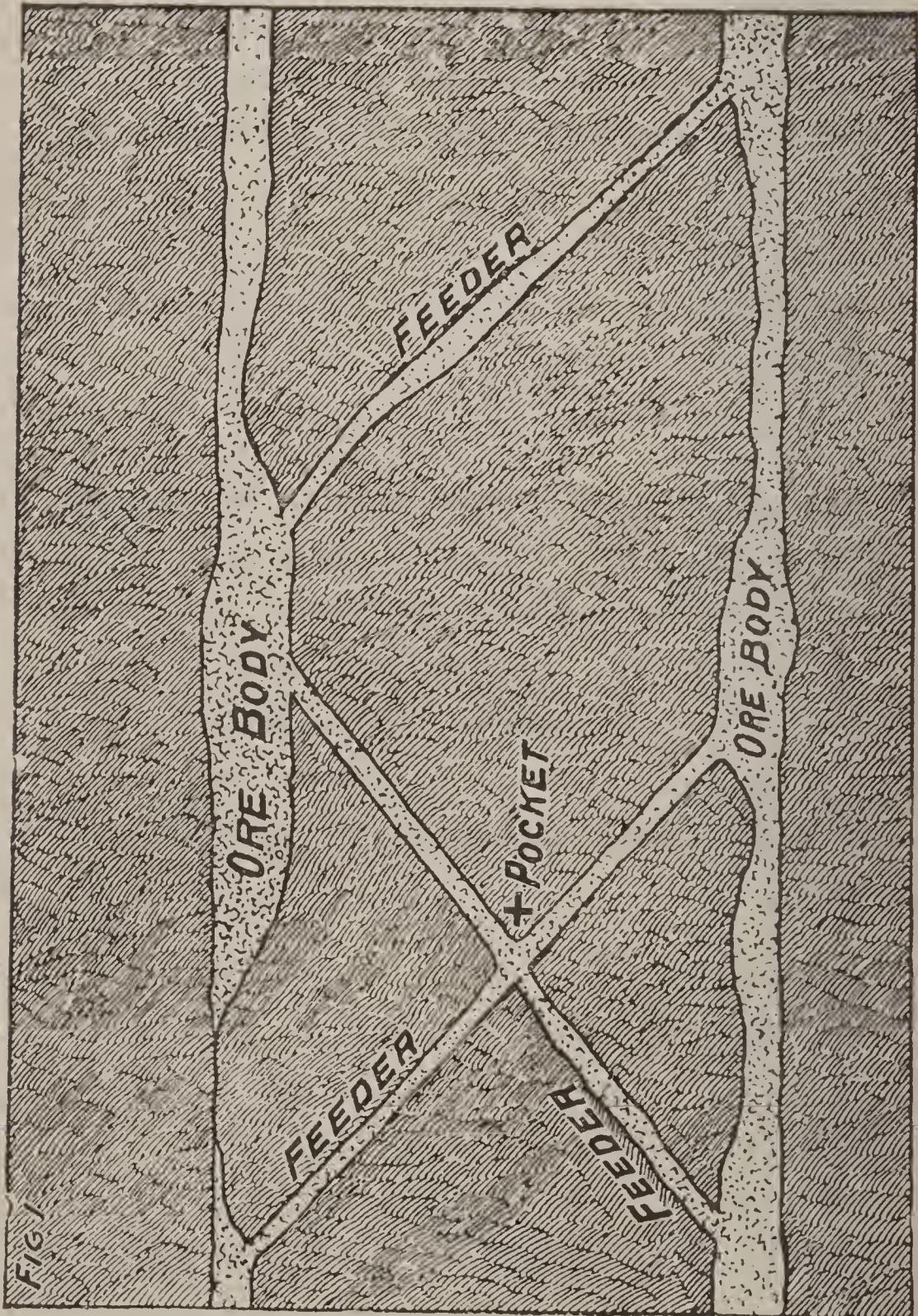
who would purchase the claims at a high price and tell the Mexicans to see wonders that would be done by American enterprise. The common result was a failure; a large, costly mill was erected, a multitude of laborers were employed, they did not know how to select the rich rock from the poor quartz, the mill was so large that it could not be kept going without receiving all the poor, as well as the rich rock.

Mills were built in places where only a little pocket of rich quartz had been found and if pay rock was abundant, it was not properly selected, or if selected the amalgamation was intrusted to a man who knew nothing of the business, and the gold was lost. The rich rock, in which the Mexicans had been at work was soon exhausted, the creditors who had loaned money for the erection of the mills brought suit to foreclose their mortgage, and the work stopped, and the people said quartz mining was very uncertain business. And so it is under that system of management, and that system leading to failure has been more or less followed ever since, and yet in nearly every case, prudent and competent management would have secured success. Perhaps only on a small scale, because in

many instances the quantity of pay rock was small. The veins should be carefully examined as to the richness and quantity of pay rock before mills are built.

REMARKS.

This little book has been written for the first lesson of this new system of prospecting, and as soon as this has had time to become understood by the prospector, a larger and more complete edition will be published, which will treat more fully upon this system of prospecting, and mining with other valuable information to the mining industry.



Surface View—Parallel Veins and Feeders.

FIG 2

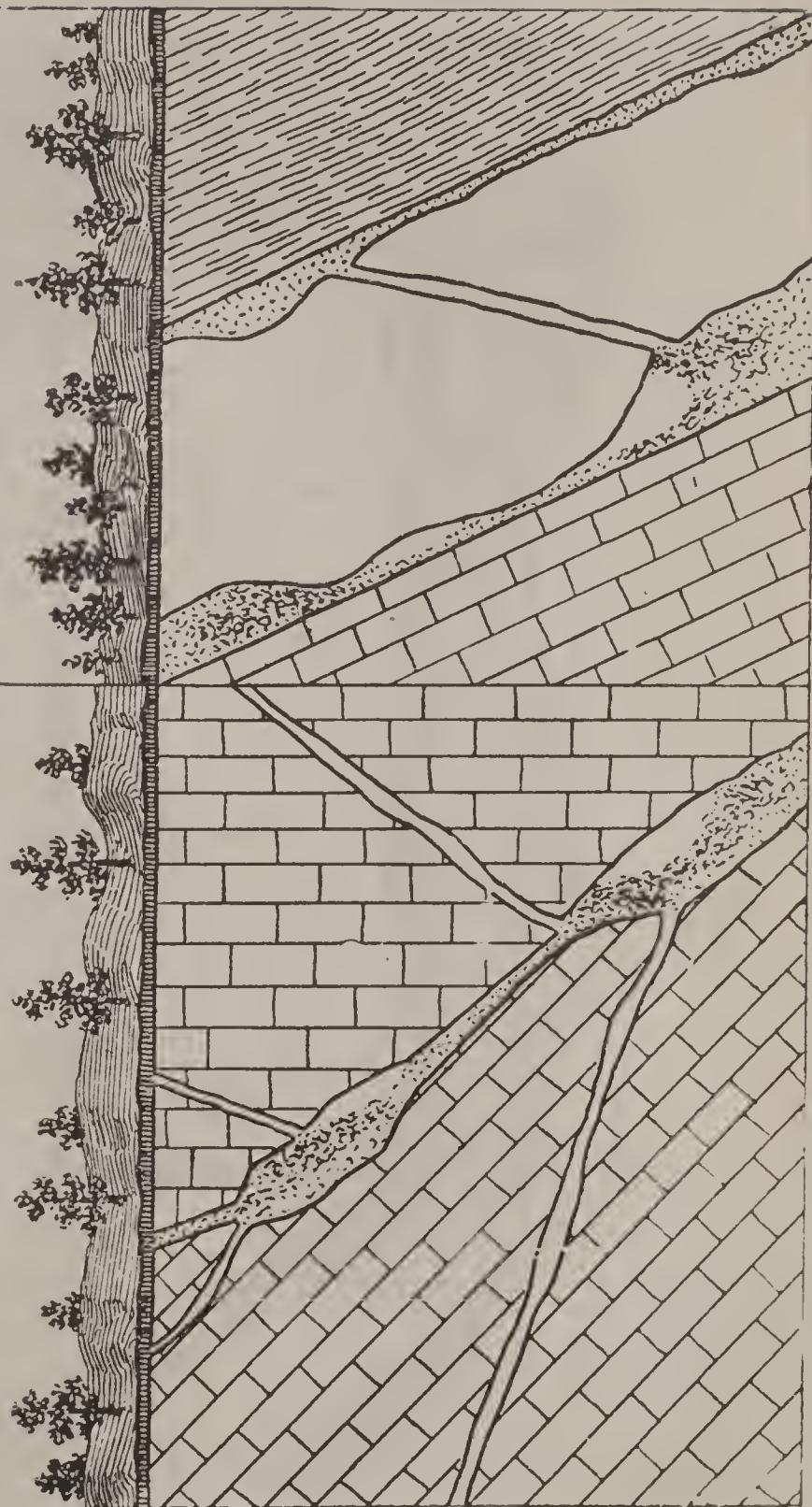
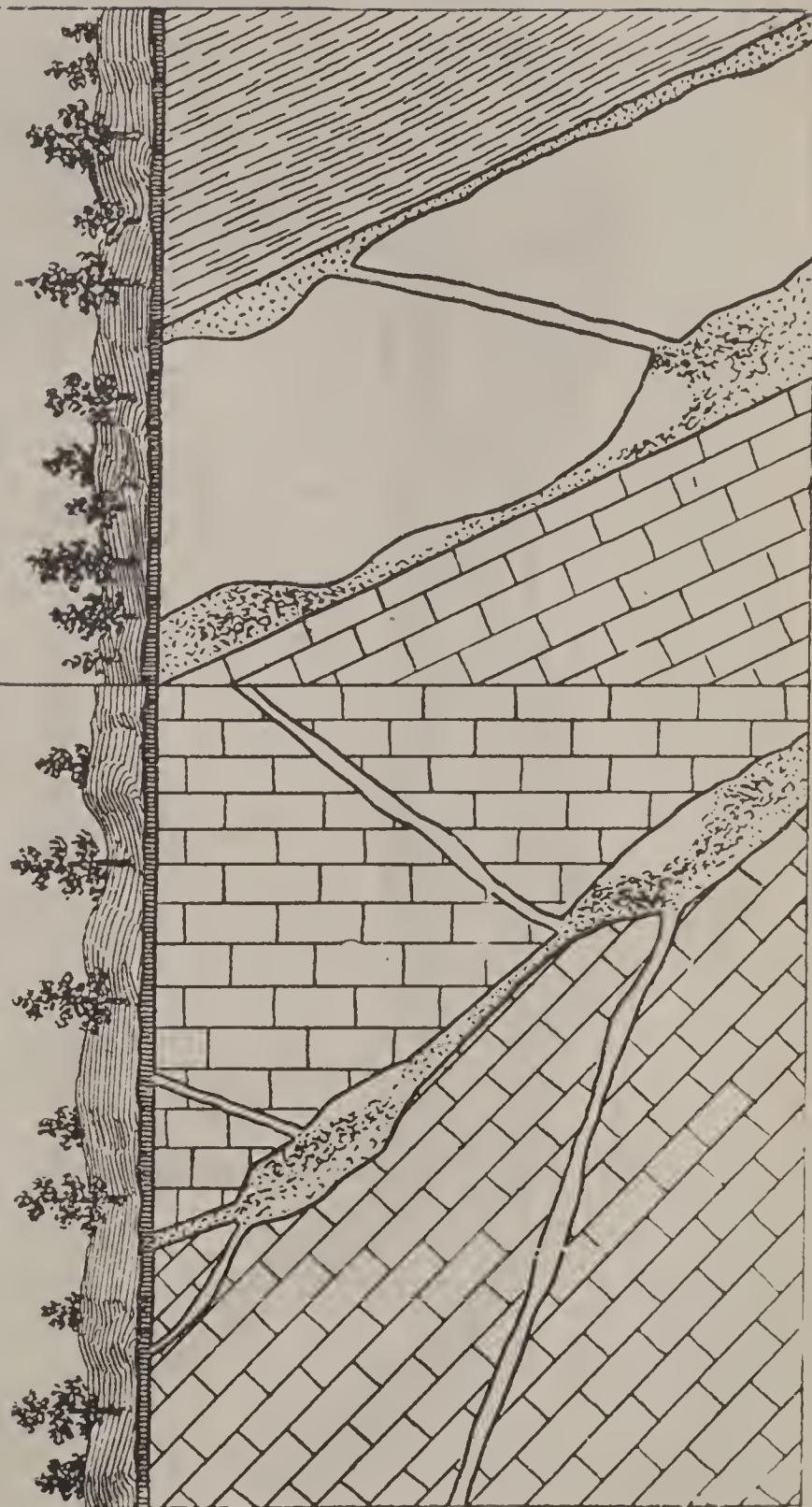


FIG 3



Vein having Two Pay Streaks.

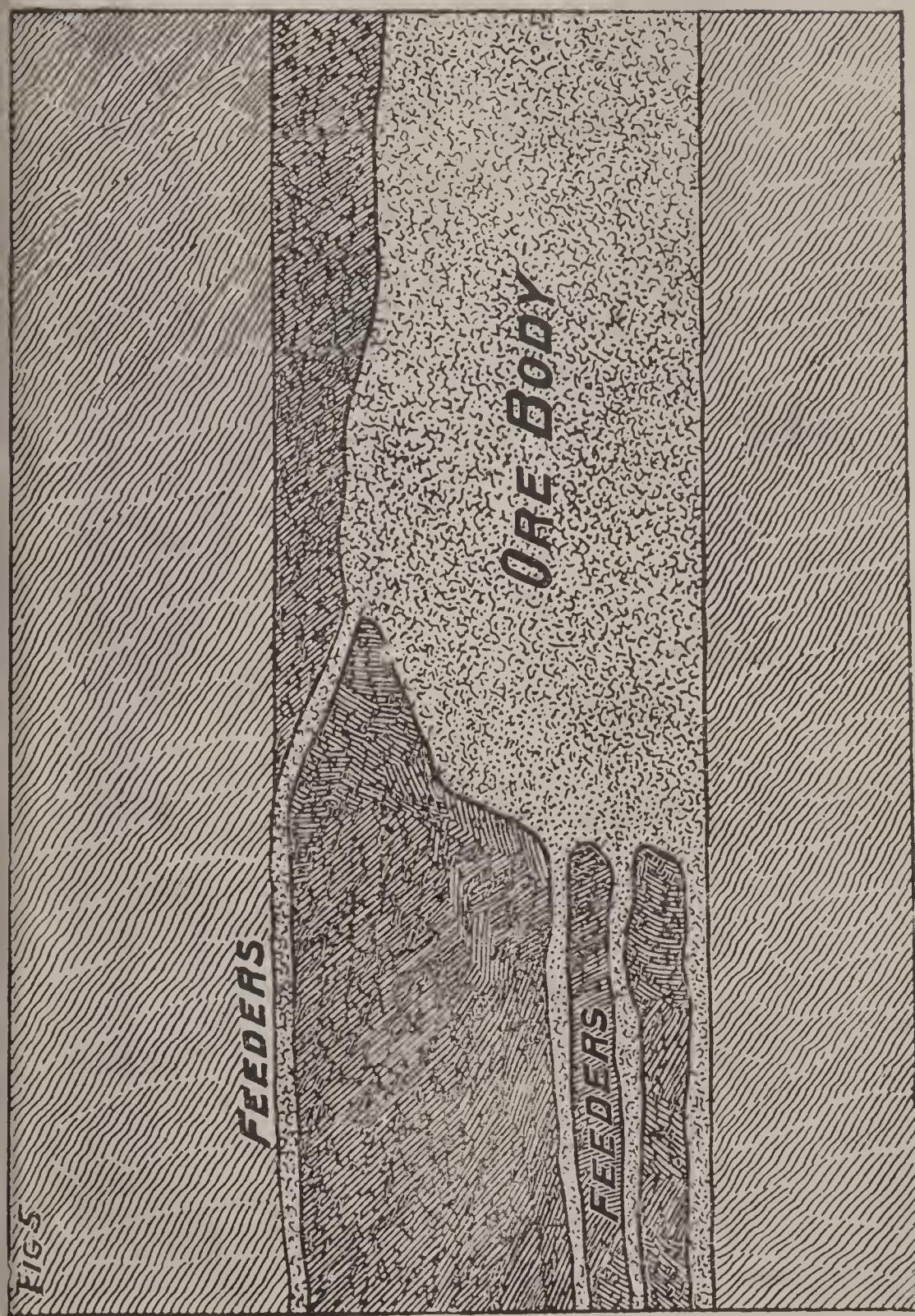
Feeders forming Ore Bodies.

FIG 4



Small Seams Forming Pockets.

FIGS

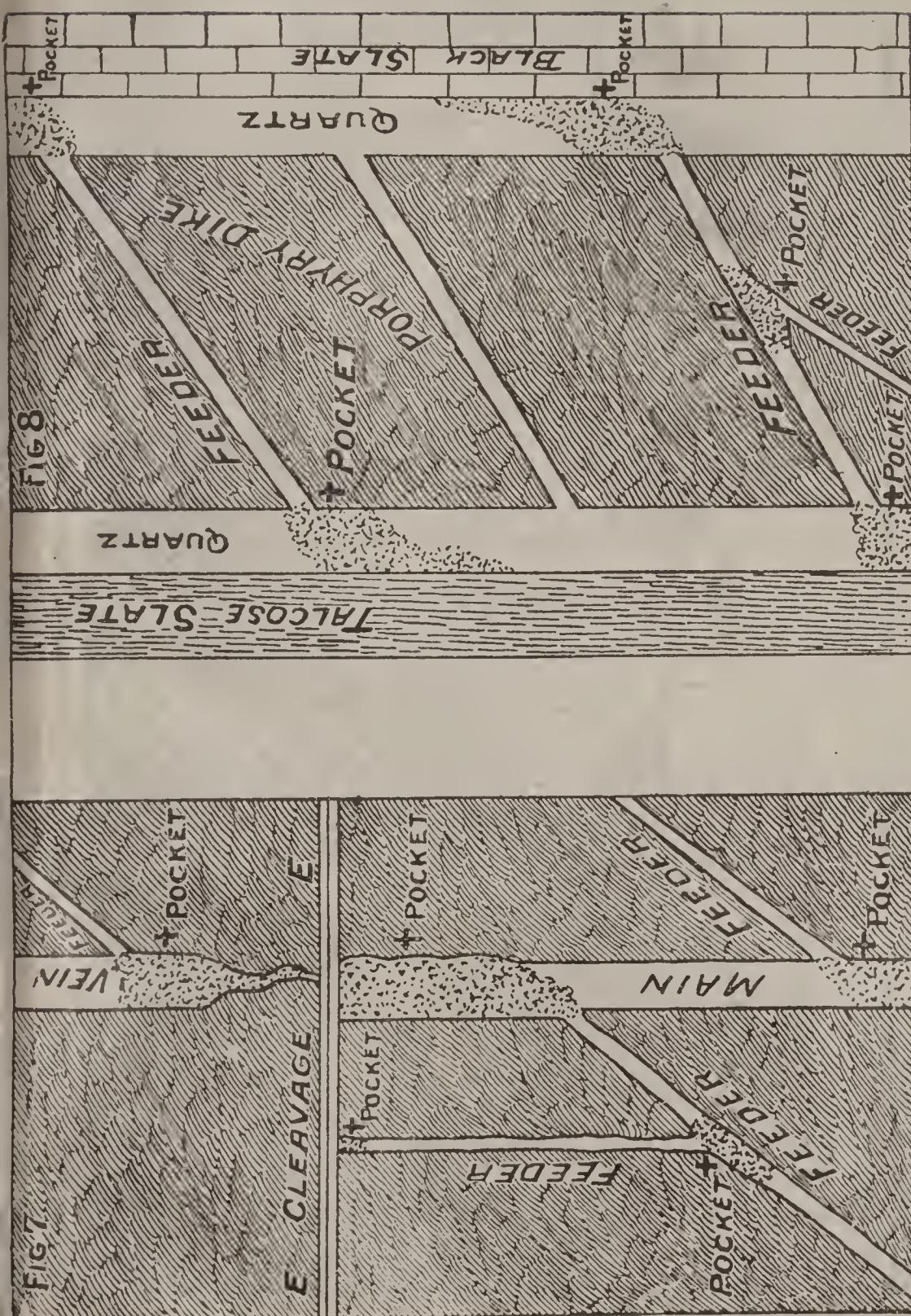


Surface View.

FIG. 6



Cut showing Quartz Vein and how to test the same for Ore Bodies. Samples to be taken at Black Dots



Surface View, Great Northern Mine,
Grant County, Oregon.

Bonanza Pocket Mine, Tuolumne County, California.

Fig. 9

SLATE PORPHYRY GRANITE

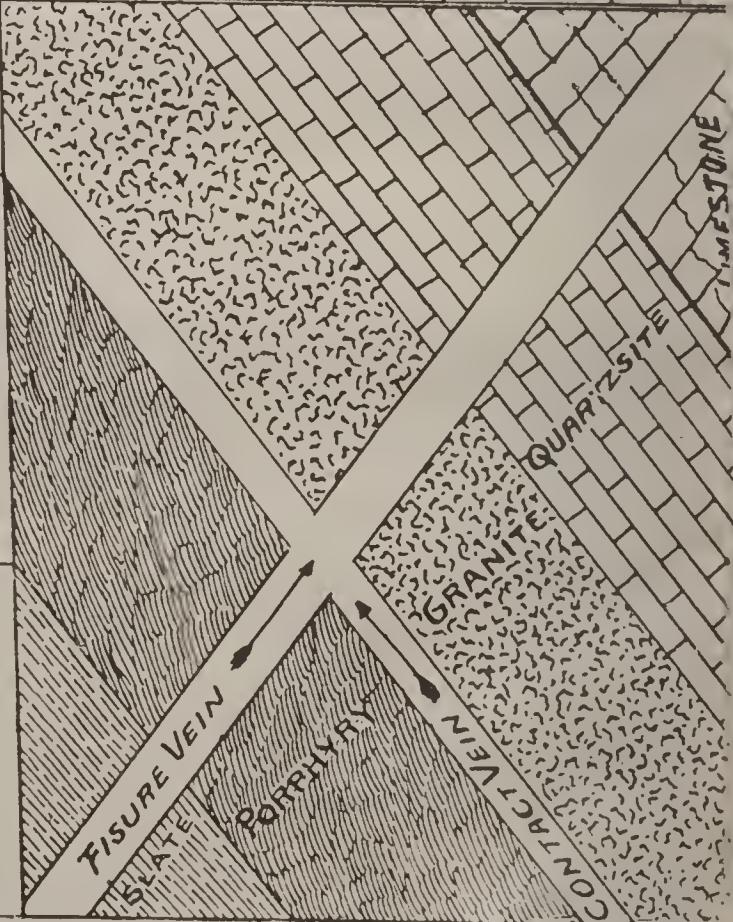


Fig. 11

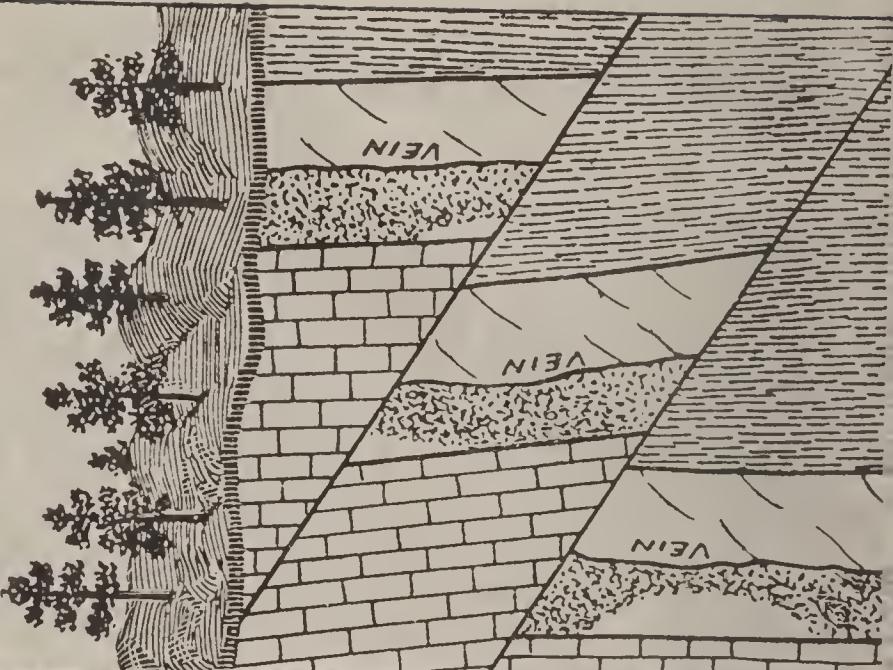


FIG 10



FIG 12



Cut showing Heads of Placer Ground. The trace of Gold will be found by testing the loose earth matter at the Black Dots.

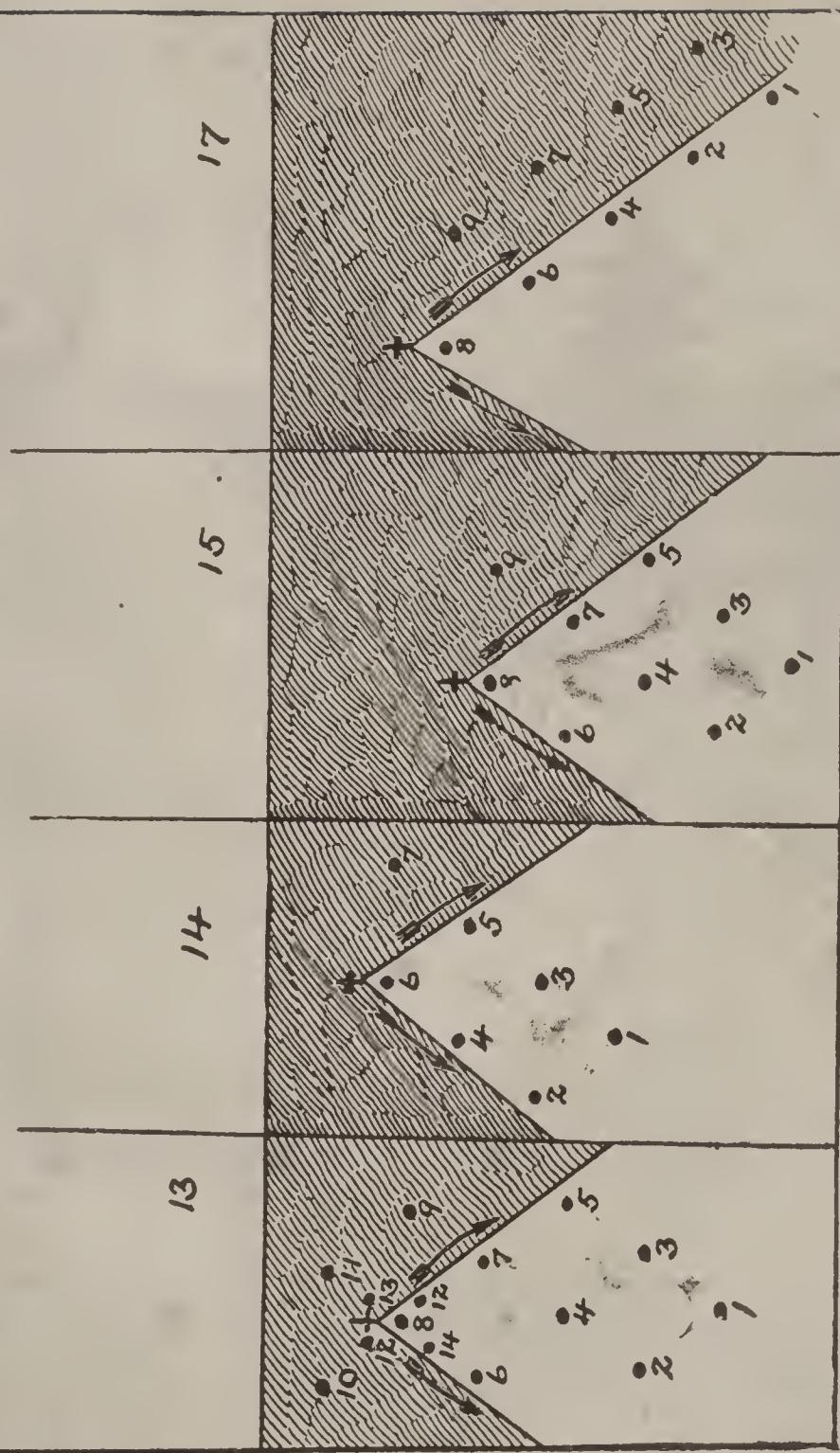
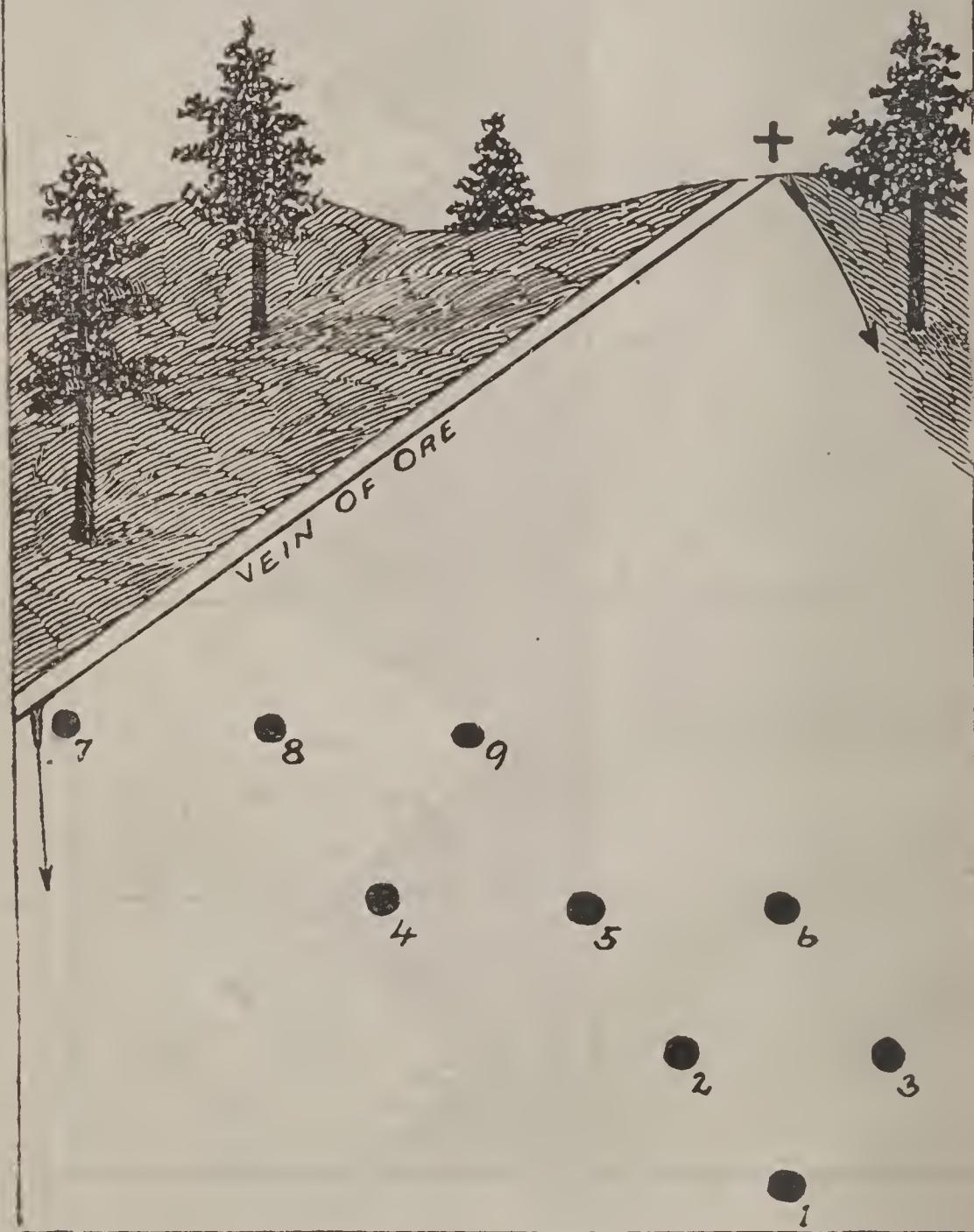


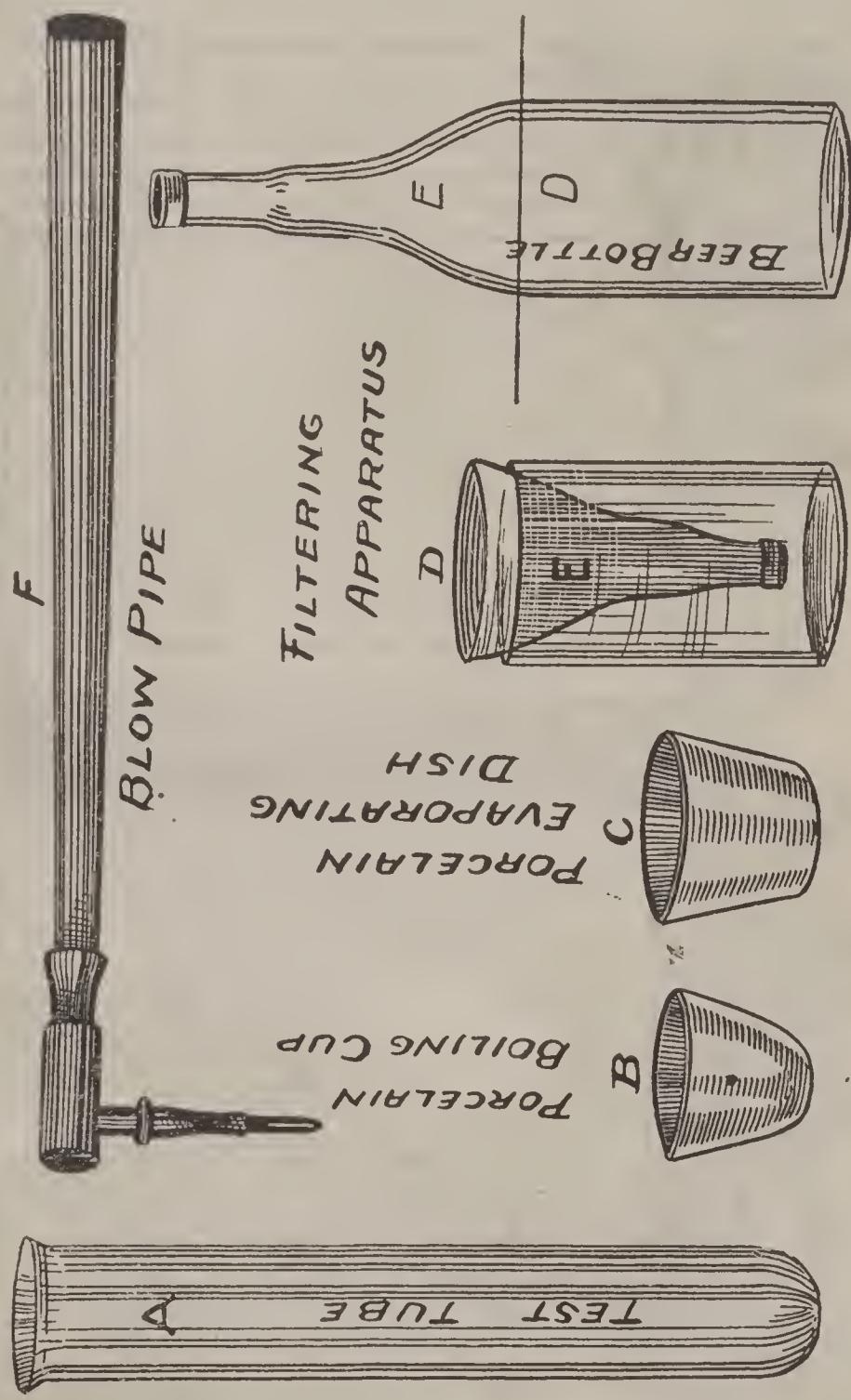
Chart showing the different positions on the hillsides. Samples to be taken at Black Dots. Dot 1 starting point; Dots 2 and 3, test for directions.

FIG 16



System of using Three Post Holes instead of Two.

Fig 18



Handy Outfit for Prospectors to Test Ore in the Field.

FIG 22



A View of Placer Ground and showing how to test the Vein for the Ore Shoots; samples to be taken out at Black Dots under the line of the vein.

HOW TO GET AN ORE TESTING OUTFIT.

In order that the readers of this book might be able to follow out its instructions, and fully profit by the information contained herein, we tried to get the assayers to put up and offer for sale in this book an outfit suitable for the prospector to test ores with, but wanting all prospectors and miners to send the samples to them they refused to a man, to do anything in that line, or to give any information on the subject. It is a well known fact that the poor prospector and struggling miner are treated with indifference by the assayers, as a rule, and that often it is impossible for them to get fair or just treatment in the assaying of their ores.

The wholesale druggists, not desiring to incur the illwill of the assayers, refused to put up such outfits or make known to the prospectors and miners at what figures they can obtain the necessary material from them.

Not wishing the information contained in this book to be of no use to the prospectors and miners who may read it, but desiring that all students of this system of prospecting and mining may be fully equipped to do

his work thoroughly and successfully, and thus retain the benefits of his efforts instead of them slipping from him to be lost or to enrich another, we have made arrangements whereby we can furnish all the necessary materials and appliances.

The appliances are the best to be had, and the chemicals, the purest made.

Beware of cheap acids, sulphides and chlorides purchased at country town drugstores, as they are almost useless for ore testing.

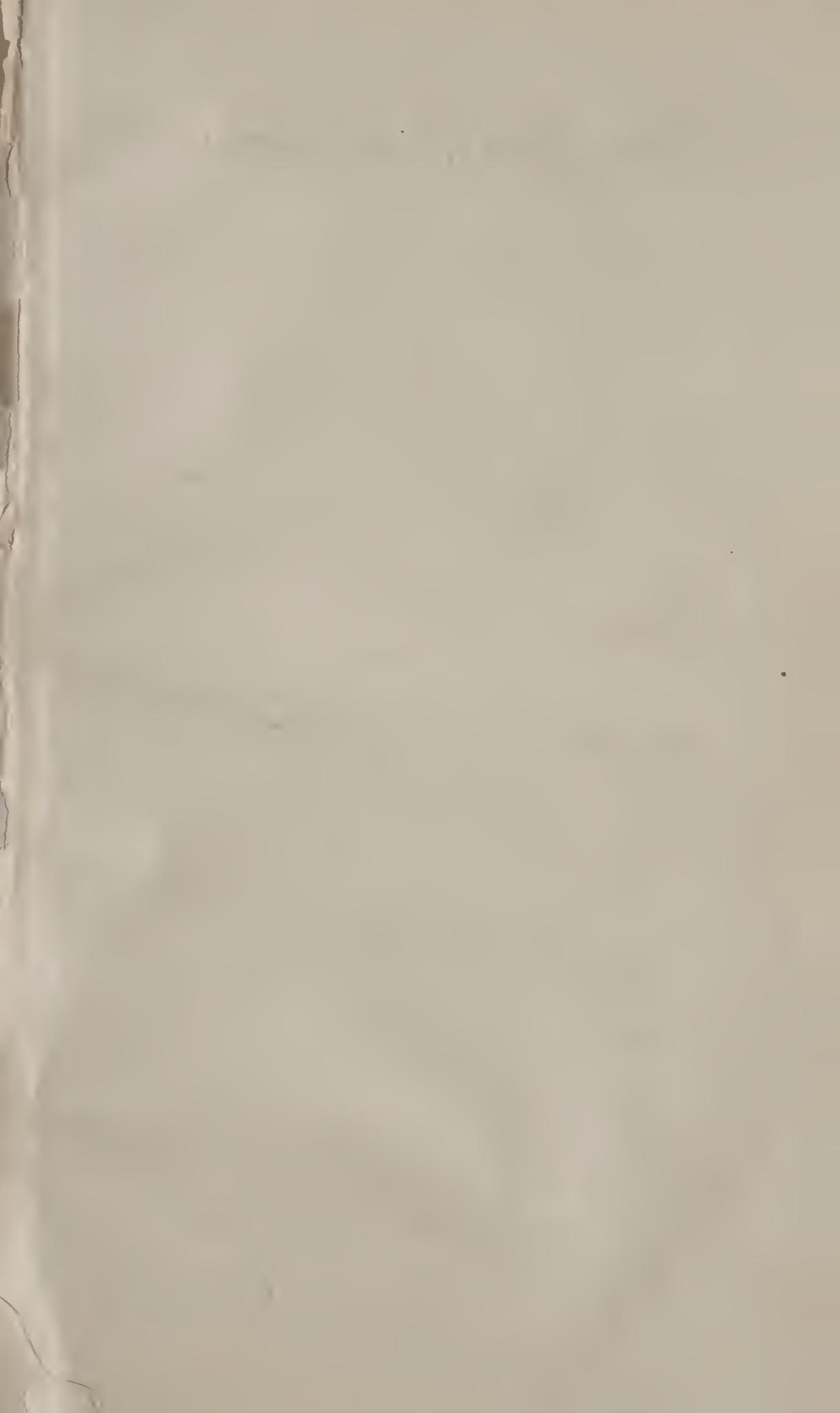
We will furnish all the necessary materials at the lowest market price.

Complete outfits consisting of one pair of scales, one blowpipe, one test tube, one filter, 12 sheets of filter paper, one borcelean poiling cup, one porcelean evaporating dish, a two ounce vial of each of the acids and two ounces of each of the sulphides, chlorides, caustics, etc., will be sent by express, carefully packed, and everthing correctly labeled, for (\$10.00) ten dollars.

The liquid acids cannot be sent by mail, but we will furnish any of the appliances or dry materials post paid for lowest market prices.

If any articles mentioned in the complete outfit are not wanted we will deduct its price from the price of the outfit and we will send the rest.

TALBOT & ADDIS,
P. O. Box 833. Portland, Oregon.



The Gold Tracer.

A Practical Guide for Prospeetors and Miners.

This is the only practical and scietific work on the subject ever printed. The author has spent most of his life in the mineral bearing mountains, and has discovered and tested a new method of prospecting, and proved it to be a truly scientific method. By following the instructions of this book anyone can hunt gold successfully in any or all gold producing regions.

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